

Title: star-shaped conveyor for feeding or discharge empty plastics containers or bottles to or from a machine and orienting and aligning machine having said star-shaped conveyor

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DESCRIPTION

The present invention relates to a star-shaped conveyor for feeding or discharging empty plastics containers or bottles to or from a machine and an aligning and orienting machine comprising said star-shaped conveyor.

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A star-shaped conveyor is a conveyor comprising a disk rotating around its vertical axis, a plurality of regularly or not regularly spaced apart recesses or indentations are formed in its periphery, these indentations or recesses are adapted to receive and transfer empty bottles to a machine and from a bottle processing machine, e.g. a rinsing machine or an orienting and aligning machine

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The star-shaped conveyor which supplies/takes bottles to/from the bottle processing machine, must be perfectly synchronized with the same machine in order to avoid jamming.

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According to the present needs, all of the empty bottle processing machines must process bottles of

different shapes or bottles having the same shape but different capacity.

As the shape is changed, the prior art star-shaped conveyors must be subjected to complex mechanical
5 modifications, and sometimes it is even necessary to change also the shape and the pitch of the recesses defined in the star-shaped conveyor.

Extremely complicate star-shaped conveyors having changeable indentations are known, which require
10 time-consuming adjustments and consequently long downtimes whenever the bottle size is changed.

The object of the present invention is to implement a star-shaped conveyor designed to transport bottles of varying sizes or capacities without changing the
15 recess shape.

Another object is to simplify the operation of discharging the empty bottles even the deformed ones. These and other objects will be achieved by a star-shaped conveyor for feeding or discharging empty
20 plastics containers or bottles to or from a machine and an orienting and aligning machine including said star-shaped conveyor, object of the present invention, which are characterized by the attached claims.

These and other characteristics will be better understood by the following description, given only in a non limiting illustrative way, of a preferred embodiment shown in the attached drawings, wherein:

- 5- Fig. 1 is a perspective view of the star-shaped conveyor partially sectioned to show some details,
- Fig. 2 is a perspective view of a sucking apparatus mounted to the star-shaped conveyor,
- Fig. 3 is a perspective view of a vacuum source
10 located under the star-shaped conveyor,
- Fig. 4 is a perspective view of the star-shaped conveyor mounted to a machine for orienting and aligning empty plastics bottles,

Referring to Fig. 1, reference number 1 generally
15 shows a star-shaped conveyor formed by two circular plates 2, 3, defining along their peripheries indentations or recesses 4 adapted to receive bottles 6 coming, in the example shown, from a machine 5 for orienting and aligning empty plastics bottles 6.

20 The bottles exiting said machine are transferred on a mechanical or pneumatic conveyor 7 which transports them to a filling apparatus.

Box elements 8 are sandwiched the two plates 2, 3. Each box-element has a face 10 shaped to perfectly

follow the curvilinear outline of the recesses 4 and formed in dependence on the biggest bottles. A vertical opening 9 is defined in each face 10.

5 The lower face of each box element 8 is opened and abuts the lower plate 2 in correspondence of horizontal openings 11.

Openings 11 are defined along a circumference and overlap an underlying slot 12 defined in a surface 13 of a cylindrical chamber 14 in which there is a
10 negative pressure.

Slot 12 span an arc varying from 90° to 180°.

The cylindrical chamber 14 is connected by a tube 15 to a fan 16 which sucks air from said chamber in order to establish said negative pressure.

15 The vertical opening or slot 9 of each box element 8 must have a width that assures a contact with a bottle having the lowest diameter that the star-shaped conveyor can process, in this way it is possible to process every bottle having a greater
20 diameter obviously up to the maximum limit determined by the recess depth and cross-section. The star-shaped conveyor is rotatively driven by known and not illustrated driving means which are independent or connected to a machine which the

conveyor is connected to.

The operation of the star-shaped conveyor will follow,

All of the box elements located on the slot 12 are
5 connected to the cylindrical chamber 14 from which
air is sucked by the fan, in this way every container
which will come in front of the above mentioned slots
will be sucked and hold in the recess until the box
element will depart from the slot 12.

10 In the shown example, the bottles will be held for a
180° arc, anyway by extending or shortening the arc
it will be possible to change the bottle discharge
position with respect to the take up position.

To this end, it is provided a sliding door (not
15 shown) to reduce the working arc of said slot and
consequently change the angular discharge position.

In addition, the star-shaped conveyor is also rotated
around its vertical axis by driving means which are
not expressly described and shown, said driving means
20 can be independent or dependent on the machine for
introducing or taking bottles which the conveyor is
connected to.

As it is shown in Figures 2, 3 and 4, the star-shaped
conveyor can be preferably but not exclusively

applied in a machine for orienting and aligning bulk bottles received in a cylindrical container of said machine.

As a matter of fact, the latest models of said
5 machines must be capable to process different types of containers particularly of different capacity such as the mineral water filling apparatus which must process bottles of half liter to two liters.

Said machines, such as the machine described in the
10 Italian patent N. 1287097, are provided with two or more discharge locations for increasing their productivity and require a carousel 20 carrying a plurality of spacers 21 forming a number of channels which is multiple of a number of the funnel discharge
15 channels minus one.

The discharge channel, not shown, are located above the spacers and they are carried by a cylindrical wall which rotates around a vertical axis at a speed different from that of the carousel 20 carrying the
20 spacers.

Therefore it is necessary a star-shaped conveyor for picking up the bottles from the spacers and transporting them along a predetermined direction; by means of two star-shaped conveyors and keeping

unchanged the rotation direction of the aligning machine, it is possible to feed bottles along a direction opposite to that shown in figures.

Applying the star-shaped conveyor which holds bottles

5 by a negative pressure attached to an aligning machine it is possible to obtain several advantages, among them:

- the shape of the spacers and/or discharge channels is simplified.

10- It is possible to get rid off a bottle sliding surface because bottles travel hanging and held by their bodies.

- It is possible to get rid off the devices for extracting defective and crushed bottles.

15 The above described star-shaped conveyor can be applied at the exit of a rinsing machine, wherein an incorrect synchronization of the star-shaped conveyor with the machine can break the bottles.

For making easier the insertion of the bottles by the
20 pneumatic conveyor 7 according to bottle size change, the conveyor can be provided with means for rising or lowering it, or the star-shaped conveyor, which can have and independent driving means or dependent on the machine which is connected to, must be capable of

moving vertically.

The star-shaped conveyor can be rotated by driving a slotted shaft which, in turn, rotates a sleeve coupled to said slotted shaft, which in turn rotates

5 said star-shaped conveyor.

The cylindrical stationary chamber must also obviously follow the vertical motion of the star-shaped conveyor.